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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,923	11/16/2001	Kenneth Meade Lakin		3478

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SUMMONS, BARBARA

ART UNIT	PAPER NUMBER
2817	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/990,923	Lakin
Examiner	**Group Art Unit**
Barbara Summons	2817

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 (three) MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☐ Responsive to communication(s) filed on _____.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1-16 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

☒ Claim(s) 16 is/are allowed.

☒ Claim(s) 1-8, 10, 12, 13, and 15 is/are rejected.

☒ Claim(s) 9, 11, and 14 is/are objected to.

☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☒ The drawing(s) filed on 11/16/01 is/are objected to by the Examiner

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)–(d)

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)–(d).

☐ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☐ Certified copies of the priority documents have been received in Application No. _____.

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO–1449, Paper No(s). _____

☒ Notice of Reference(s) Cited, PTO–892

☐ Notice of Draftsperson's Patent Drawing Review, PTO–948

☐ Interview Summary, PTO–413

☐ Notice of Informal Patent Application, PTO–152

☐ Other _____

Office Action Summary

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification (see pg. 2, lns. 17-27; pg. 3, lns. 5-12; pg. 5, ln. 21 through pg. 7, ln. 26; pg. 8, lns. 1-26; and pg. 20, lns. 19-21) is not a proper information disclosure statement. 37 CFR § 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR § 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: "208", "209", "210", "211" and "212" shown in Fig. 2; "400" shown in Fig. 4, and "402" shown in Figs. 4 and 12; "700" shown in Fig. 7. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. In order to avoid a lengthy amendment, if Applicant agrees with the following informalities in the specification, the Examiner will make the corrections at the time of issue.

The disclosure is objected to because of the following informalities: On page 16, line 28, it appears that "424" should correctly be --427--. On page 18, line 3, it appears that "424" should be --427--; and on page 18, line 4, "resonances" should be followed by a comma --,--. Notification of agreement or disagreement is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1-5 are rejected under 35 U.S.C. § 102(e) as being anticipated by Watanabe U.S. 6,492,759.

It should be noted that in this rejection, and all following rejections the resonators will be considered to be "approximately critically coupled" or "over-coupled" if the resulting filter has bandpass characteristics (see the other prior art of record cited as evidence).

Fig. 3 of Watanabe discloses a microwave filter (see e.g. col. 1, lns. 18-20, and col. 7, lns. 1-5) comprising: a first piezoelectric bulk acoustic wave (BAW) resonator formed by upper electrode 21, lower electrode 23 and piezoelectric layer 1 made of an insulating material (see e.g. col. 8, lns. 3-9); a second BAW resonator formed by upper electrode 22, lower electrode 23 and piezoelectric layer 1 made of an insulating material (ibid.), the second acoustic resonator being acoustically coupled to the first resonator (see e.g. col. 7, lns. 19-20 and 28-31); and a plurality of intervening layers (i.e. multiple comb electrode layers 26) of material located between the first acoustic resonator and the second acoustic resonator and affecting the amount of the acoustic coupling between the first and second BAW resonators (see col. 7, lns. 25-30); and wherein the first and second BAW resonators are inherently either approximately critically coupled or over-coupled due to strength of the acoustic coupling making for the wide passband (see col. 7, lns. 1, 18-20 and 28-31; Applicant's Fig. 8; and the other prior art of record cited as evidence). Additionally, the first BAW resonator is connected to a signal input port (electrode 24) and the second BAW resonator is connected to a signal output port (electrode 25).

6. Claims 1, 2, 4, 12 and 13 are rejected under 35 U.S.C. § 102(b) as being anticipated by Weber U.S. 5,864,261.

Fig. 5 of Weber discloses a microwave filter (see col. 1, lns. 17-18) comprising: a first piezoelectric BAW resonator 100 having a piezoelectric layer made of an insulating material (see col. 1, lns. 23-26); a second BAW resonator 120 having a piezoelectric layer made of an insulating material (ibid.), the second BAW resonator 120 being acoustically coupled to the first

BAW resonator 100 (see col. 8, lns. 40-42 and 53-56); and a plurality of intervening layers (140 and 150) of material located between the first and second BAW resonators affecting the amount of the acoustic coupling between the first and second BAW resonators. That is, the cross-sectional area of plug 150 over which energy couples affects, and hence, the size of the area of the resonators covered by layers 140 also equally affects the acoustic coupling between the resonators (see e.g. col. 8, lns. 53-65, and col. 9, lns. 1-3). Additionally, the resonators must inherently be either approximately critically coupled or over-coupled in order to form the discloses multiple-pole filter (see col. 8, lns. 39-40, and col. 9, lns. 3-8).

Regarding claims 12 and 13, the microwave filter further comprises: a substrate 240; an acoustic reflector 130 (see col. 8, lns. 47-50); and wherein the first and second BAW resonators (100 and 120) and the intervening layers (140 and 150) are supported on the substrate 260 by the acoustic reflector 130.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 10 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Weber 5,864,261 in view of Poirier et al. U.S. 3,568,108.

Fig. 5 of Weber discloses the microwave filter with a first BAW resonator 100 acoustically coupled to a second BAW resonator 120 as discussed above. Additionally, Fig. 5 of Weber also discloses the filter further comprising: a third BAW resonator 110 including a piezoelectric layer of material (see col. 1, lns. 23-26 and col. 7, lns. 51-55), wherein the third BAW resonator 110 is acoustically coupled to the second BAW resonator 120 (see col. 8, lns. 53-56); the second BAW resonator 120 being located between the first and third BAW resonators 100 and 110 (i.e. in either the left to right direction in the figure or in a signal traveling direction); and a second plurality of intervening layers (140 and 151) of material located between the second BAW resonator 120 and the third BAW resonator 110.

However, Weber does not explicitly show the first BAW resonator 100 being electrically connected to a signal input port, and the third BAW resonator 110 being electrically connected to a signal output port.

Weber does disclose the three resonator device is a filter (see col. 8, lns. 38-41) which must inherently have input and output signal ports, and discloses that if only two resonators were needed then resonator 110 would be omitted (see col. 9, lns. 4-9) thereby suggesting the signal flow of from first resonator 100 to second resonator 120 to third resonator 110.

Poirier et al. shows that it is known to connect signal ports to BAW resonators, even those with acoustic reflecting/coupling layers disposed on both sides thereof (see specifically the output port in the figure).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the microwave filter of Weber (Fig. 5), if even necessary,

such that it would have had an input port connected to the first resonator 100 and an output port connected to the third resonator 110 because the filter must inherently have input and output ports, and because Weber suggests the signal flow to be from the first to the third resonators (i.e. by suggesting the elimination of third resonator 110 in a two resonator filter see col. 9, lns. 4-9), and because Poirier et al. suggests the obvious manner of coupling ports to BAW resonators which have acoustic reflector/coupling layers on both sides thereof (see the output port in the figure), such an obvious modification thereby requiring only routine skill in the art.

9. Claims 6-8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe U.S. 6,492,759 in view of Nishimura et al. U.S. 5,608,362.

Fig. 3 of Watanabe discloses the filter having a first resonator (layers 21, 1 and 23) and a second resonator (layers 22, 1 and 23) with intervening layers 26 therebetween affecting the acoustic coupling between the resonators, the piezoelectric layer 1 of the resonators being made of an insulating material.

However, Watanabe does not disclose a further third resonator acoustically coupled to a fourth resonator by intervening layers, and wherein the third resonator is electrically coupled to the second resonator, an input port is coupled to the first resonator, and an output port is coupled to the fourth resonator.

It should be noted that connecting two of the filters of Fig. 3 of Watanabe electrically in cascade so that second resonator (22, 1, 23 of the first filter) would be electrically coupled via electrode 25 to a third resonator (21, 1, 23 of the second filter) which would be acoustically

coupled to a fourth resonator (22, 1, 23 of the second filter) by a second plurality of intervening layers 26 of the second filter, provides the claimed structure.

Nishimura et al. discloses that it is known to couple electrically equivalent two resonator filters in electrical cascade to achieve the desired total filter characteristics (see Fig. 5).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the filter of Watanabe (Fig. 3) by having connected two of them electrically in cascade because such an obvious modification would have been extremely well known in the art, as suggested by the exemplary teaching thereof by Nishimura et al. (see Fig. 5), to have been a design consideration dependent upon the desired final filter characteristics as also suggested by Nishimura et al. (see also Fig. 16 and col. 5, lns. 38-47).

Allowable Subject Matter

10. Claim 16 is allowable over the prior art of record.

11. Claims 9, 11 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 16 and 9, the prior art of record does not disclose or fairly suggest a microwave device having each of the specifically recited features and also having resonators with

electrodes "having a thickness that differs" (see e.g. claim 9, lns. 4-8) [see also the similar limitation, but differently worded, in claim 16, at lines 27-33], thereby providing resonators with different resonant frequencies and/or filters with different bandpass frequencies. Regarding claim 11, the prior art of record does not disclose a filter having three resonators connected as recited with a "load" connected to the second resonator. Regarding claim 14, the prior art of record to Watanabe/Nishimura discloses a four resonator configuration, but does not use resonators of the type having an acoustic reflector, and there is no suggestion to combine such structures.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Berlincourt U.S. 3,699,484 is cited for the definitions it provides of "critically coupled" and "over-coupled" resonators as providing "a bandpass characteristic" (see col. 5, lns. 12-15).

14. Any inquiry concerning this communication should be directed to Barbara Summons at telephone number (703) 308-4947, FAX no. (703) 308-7724, receptionist's no. (703) 308-0956, Supervisory Examiner Bob Pascal (703) 308-4909

Barbara Summons

Barbara Summons
Patent Examiner
Art Unit 2817

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January 14, 2003